

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF THE CLAIMS:

Claims 1-15 (cancelled)

16. (new) scanning exposure apparatus which transfers a pattern in a rectangular area defined by a light shielding border on a first object onto a photosensitive second object through a projection system by synchronously moving the first and second objects, comprising:

an illumination system, including an optical integrator and an optical system provided on an optical axis common to said projection system, which illuminates a region perpendicular to the optical axis with a radiation from the optical integrator through the optical system so that the radiation is generated on said first object moved in a scan direction during a scanning exposure of said second object with the radiation from said first object through said projection system by said synchronous movement; and

a masking blade provided between said optical integrator and said optical system to be movable in a predetermined direction on a plane perpendicular to said optical axis, which has a pair of edges substantially parallel to each other and perpendicular to the predetermined direction in the plane, and is moved so that the pair of edges are respectively imaged at a beginning and an end of said scanning exposure onto said light shielding border by said optical system to change a width of said illuminated region with respect to said scan direction at both the beginning and the end of said scanning exposure.

17. (new) An apparatus according claim 16, wherein said illuminated region contains said optical axis and extends in a non-scan direction perpendicular to said scan direction.

18. (new) An apparatus according claim 17, wherein said illuminated region is axially centered in a circular image field of said projection system and is substantially rectangular.

19. (new) An apparatus according claim 17, wherein said illuminated region diametrically extends in a circular image field of said projection system and is substantially rectangular.

20. (new) An apparatus according claim 17, wherein the width of said illuminated region at a middle of said scanning exposure is substantially constant and broader than that of first and second portions of said light shielding border parallel to said non-scan direction with respect to said scan direction.

21. (new) An apparatus according claim 20, wherein said masking blade is moved so that one of said pair of edges is imaged onto said first portion at the beginning of said scanning exposure and the other of said pair of edges is imaged onto said second portion at the beginning of said scanning exposure.

22. (new) An apparatus according claim 21, wherein the width of said illuminated region, in said scan direction, is gradually increased at the beginning of said scanning exposure and is gradually decreased at the end of said scanning exposure to prevent the outside of said light

shielding border from illuminating with said radiation.

23. (new) An apparatus according claim 17, wherein the width of said illuminated region, in said scan direction, is gradually increased at the beginning of said scanning exposure and is gradually decreased at the end of said scanning exposure to prevent the outside of said light shielding border from illuminating with said radiation, and is substantially constant at a middle of said scanning exposure.

24. (new) An apparatus according claim 17, wherein said optical system images said each edge with an enlargement magnification onto said light shielding border, and said plane is substantially conjugate with a surface of said first object on which said pattern is formed with respect to said optical system.

25. (new) An apparatus according claim 24, wherein said illumination system includes an optical device provided on said optical axis different from said masking blade so that said radiation has a shape substantially rectangular on a plane different from said plane and perpendicular to said optical axis, and said optical system

images the rectangular radiation on the different plane onto said illuminated region.

26. (new) An apparatus according claim 25, wherein said optical device has a shaping portion on said different plane in which said rectangular radiation is generated and of which an image on said predetermined plane by said optical system has a width substantially equal to that of said illuminated region at a middle of said scanning exposure with respect to said scan direction.

27. (new) An apparatus according claim 26, wherein said optical device includes an aperture stop, having a rectangular aperture as said shaping portion, provided adjacent to said masking blade.

28. (new) An apparatus according claim 24, wherein said masking blade includes a first portion having one of said pair of edges and a second portion having the other of said pair of edges which are separately movable from each other.

29. (new) An apparatus according claim 24, wherein said masking blade has another pair of edges substantially

parallel to said predetermined direction and perpendicular to said pair of edges, each which is imaged onto said light shielding border by said optical system during said scanning exposure to define a width of said illuminated region in said non-scan direction.

30. (new) An apparatus according claim 29, wherein said masking blade includes plural portions separately movable from each other on which said pair of edges and said another pair of edges are provided.

31. (new) An apparatus according claim 17, further comprising a stage system having a first stage provided at one side of said projection system to move said first object and a second stage provided at the other side of said projection system to move said second object, and separately moving the first and second stages from each other to synchronously move said first and second objects during said scanning exposure.

32. (new) An apparatus according claim 31, wherein said stage system has a first interferometer to detect first positional information of said first stage in different directions including said scan direction and a

second interferometer to detect second positional information of said second stage in different directions including a scan direction, said first and second stages are moved based on the first and second positional information during said scanning exposure.

33. (new) An apparatus according claim 32, wherein said first and second positional information includes yawing information of said first and second stages respectively, said first and second objects are relatively rotated based on the yawing information during said scanning exposure.

34. (new) An apparatus according claim 33, wherein said first and second objects are relatively rotated with respect to a predetermined point in a distribution of said radiation.

35. (new) An apparatus according claim 34, wherein said predetermined point is substantially coincident with a center of the distribution of said radiation or said optical axis.

36. (new) A scanning exposure apparatus which transfers a pattern in a rectangular area defined by a light shielding border on a first object onto a photosensitive second object through a projection system by synchronously moving the first and second objects, comprising:

an illumination system, having an optical integrator provided on an optical axis common to said projection system, which illuminates said first object with a radiation from the optical integrator during a scanning exposure of said second object with the radiation from said first object through said projection system by said synchronous movement; and

a masking blade provided in a path of said radiation to be movable in a predetermined direction on a plane perpendicular to said optical axis, which has a pair of edges substantially parallel to each other and perpendicular to the predetermined direction in the plane, and is separately moved from said first and second objects so that a width of a defined region of said radiation on said second object, with respect to a scan direction in said synchronous movement, is gradually increased at a beginning of said scanning exposure by one of the pair of edges and is gradually decreased at an end of said scanning

exposure by the other of the pair of edges, the defined region containing said optical axis and extending in a non-scan direction perpendicular to the scan direction.

37. (new) An apparatus according claim 36, wherein said defined region is axially centered in a circular image field of said projection system and is substantially rectangular.

38. (new) An apparatus according claim 36, wherein said defined region diametrically extends in a circular image field of said projection system and is substantially rectangular.

39. (new) An apparatus according claim 37, wherein the width of said defined region, with respect to said scan direction, is substantially constant at a middle of said scanning exposure.

40. (new) An apparatus according claim 39, wherein said masking blade includes a first portion having the one edge and a second portion having the other edge which are separately movable from each other.

41. (new) An apparatus according claim 39, wherein said masking blade has another pair of edges substantially parallel to said predetermined direction and perpendicular to said pair of edges to determine a width of said defined region with respect to said non-scan direction.

42. (new) An apparatus according claim 41, wherein said masking blade includes plural portions separately movable from each other on which said pair of edges and said another pair of edges are provided.

43. (new) An apparatus according claim 36, further comprising a stage system having a first stage provided at one side of said projection system to move said first object and a second stage provided at the other side of said projection system to move said second object, and separately moving the first and second stages from each other to synchronously move said first and second objects during said scanning exposure.

44. (new) An apparatus according claim 43, wherein said stage system has a first interferometer to detect first positional information of said first stage in different directions including a scan direction and a

second interferometer to detect second positional information of said second stage in different directions including said scan direction, said first and second stages are moved based on the first and second positional information during said scanning exposure.

45. (new) An apparatus according claim 44, wherein said first and second positional information includes yawing information of said first and second stages respectively, said first and second objects are relatively rotated based on the yawing information during said scanning exposure.

46. (new) An apparatus according claim 45, wherein said first and second objects are relatively rotated with respect to a predetermined point in a distribution of said radiation.

47. (new) An apparatus according claim 46, wherein said predetermined point is substantially coincident with a center of the distribution of said radiation or said optical axis.

48. (new) An apparatus according claim 37, wherein said masking blade is provided between said optical integrator and said first object and gradually changes a width of said radiation on said first object with respect to a scan direction at both the beginning and the end of said scanning exposure.

49. (new) A scanning exposure apparatus which transfers a pattern in a rectangular area defined by a light shielding border on a first object onto a photosensitive second object through a projection system by synchronously moving the first and second objects, comprising:

an illumination system, having an optical integrator provided on an optical axis common to said projection system, which illuminates said first object with a radiation from the optical integrator during a scanning exposure of said second object with the radiation from said first object through said projection system by said synchronous movement;

a stage system having a first stage provided at one side of said projection system to move said first object, a second stage provided at the other side of said projection system to move said second object, a first interferometer

to detect first positional information of said first stage in different directions including a scan direction, and a second interferometer to detect second positional information of said second stage in different directions including a scan direction, which moves the first and second stages based on the first and second positional information to synchronously move said first and second objects during said scanning exposure; and

a masking blade provided in a path of said radiation to be movable in a predetermined direction on a plane perpendicular to said optical axis to change a width of said radiation on said second object with respect to said scan direction at both a beginning and an end of said scanning exposure.

50. (new) An apparatus according claim 49, wherein said first and second positional information includes yawing information of said first and second stages respectively, said first and second objects are relatively rotated based on the yawing information during said scanning exposure.

51. (new) An apparatus according claim 50, wherein said first and second objects are relatively rotated with

respect to a predetermined point in a distribution of said radiation.

52. (new) An apparatus according claim 51, wherein said predetermined point is substantially coincident with a center of the distribution of said radiation or said optical axis.

53. (new) An apparatus according claim 50, wherein said masking blade includes first and second portions separately movable from each other, the first portion being moved at the beginning of said scanning exposure, and the second portion being moved at the end of said scanning exposure.

54. (new) An apparatus according claim 50, wherein said stage system has actuators to separately move said first and second stages from each other, and further comprising a different actuator from the actuators to separately move said masking blade from said first and second stages.

55. (new) A scanning exposure apparatus which transfers a pattern in a rectangular area defined by a

light shielding border on a first object onto a photosensitive second object through a projection system by synchronously moving the first and second objects, comprising:

an illumination system provided on an optical axis common to said projection system to illuminate a region perpendicular to the optical axis on said first object with a radiation from an optical integrator through an optical system during a scanning exposure; and

a masking blade provided between said optical integrator and said optical system, which has a pair of edges substantially parallel to each other in a plane perpendicular to said optical axis, and is moved so that the pair of edges are respectively imaged at a beginning and an end of said scanning exposure onto said light shielding border by said optical system to prevent the outside of said light shielding border from illuminating in a scan direction.

56. (new) An apparatus according claim 55, wherein said plane is substantially conjugate with a surface of said first object on which said pattern is formed with respect to said optical system, and said optical system has an enlargement magnification.

57. (new) An apparatus according claim 56, wherein said illuminated region is axially centered and diametrically extends in a non-scan direction perpendicular to said scan direction in a circular image field of said projection system, and the width of said illuminated region in said scan direction is substantially constant at a middle of said scanning exposure.

58. (new) An apparatus according claim 57, wherein said illumination system includes an optical device provided on said optical axis different from said masking blade so that said radiation has a shape substantially rectangular on a plane different from said plane and perpendicular to said optical axis, and said optical system images the rectangular radiation on the different plane onto said illuminated region.

59. (new) An apparatus according claim 56, further comprising a stage system having a first stage provided at one side of said projection system to move said first object and a second stage provided at the other side of said projection system to move said second object, and separately moving the first and second stages from each

other to synchronously move said first and second objects during said scanning exposure.

60. (new) An apparatus according claim 59, wherein said stage system has a first interferometer to detect first positional information of said first stage in different directions including said scan direction and a second interferometer to detect second positional information of said second stage in different directions including a scan direction, said first and second stages are moved based on the first and second positional information during said scanning exposure.

61. (new) An apparatus according claim 60, wherein said first and second positional information includes yawing information of said first and second stages respectively, said first and second objects are relatively rotated based on the yawing information during said scanning exposure.

62. (new) An illumination apparatus provided in an scanning exposure apparatus which transfers a pattern in a rectangular area defined by a light shielding border on a first object onto a photosensitive second object through a

projection system by synchronously moving the first and second objects, comprising:

an illumination system, having an optical axis perpendicular to a rectangular region on a predetermined plane in which orthogonal first and second directions are defined and on which said pattern is placed, that includes an optical integrator and an optical system on the optical axis to illuminate the rectangular region with a radiation from the optical integrator through the optical system and defines the rectangular region to contain the optical axis and to extend in the second direction so that the radiation is generated on said first object moved in the first direction during a scanning exposure; and

a masking blade provided between said optical integrator and said optical system to be movable in a predetermined direction on a plane perpendicular to said optical axis, which has a pair of edges substantially parallel to each other and perpendicular to the predetermined direction in the plane so that the pair of edges are respectively imaged at a beginning and an end of said scanning exposure onto said light shielding border by said optical system by moving the blade to change a width of said rectangular region with respect to said first

direction at both the beginning and the end of said scanning exposure.

63. (new) An apparatus according claim 62, wherein the width of said rectangular region with respect to said first direction is gradually increased at the beginning of said scanning exposure and is gradually decreased at the end of said scanning exposure to prevent the outside of said light shielding border from illuminating with said radiation at both the beginning and the end, and is substantially constant at a middle of said scanning exposure.

64. (new) An apparatus according claim 63, wherein said plane is substantially conjugate with said predetermined plane with respect to said optical system, and said optical system images said each edge with an enlargement magnification.

65. (new) An apparatus according claim 64, wherein said rectangular region is axially centered in a circular image field of said projection system on said predetermined plane.

66. (new) An apparatus according claim 65, wherein said illumination system includes an optical device provided on said optical axis different from said masking blade so that said radiation has a shape substantially rectangular on a plane different from said plane and perpendicular to said optical axis and said optical system images the rectangular radiation on the different plane onto said predetermined plane.

67. (new) An apparatus according claim 66, wherein said optical device has a shaping portion on said different plane in which said rectangular radiation is generated and of which an image on said predetermined plane by said optical system has a width substantially equal to that of said rectangular region at the middle of said scanning exposure with respect to said first direction.

68. (new) An apparatus according claim 66, wherein said optical device includes an aperture stop, having a rectangular aperture as said shaping portion, provided adjacent to said masking blade.

69. (new) An apparatus according claim 65, wherein said masking blade includes a first portion having one of

said pair of edges and a second portion having the other of said pair of edges which are separately movable from each other.

70. (new) An apparatus according claim 65, wherein said masking blade has another pair of edges substantially parallel to said predetermined direction and perpendicular to said pair of edges to define a width of said rectangular region in said second direction.